

DEPARTMENT of ENVIRONMENTAL SERVICES
Water Supply & Pollution Control Division - Biology Bureau

LAKE TROPHIC DATA

MORPHOMETRIC:

Lake: HALL POND, LOWER	Lake Area (ha):	5.02
Town: SANDWICH	Maximum depth (m):	1.7
County: Carroll	Mean depth (m):	0.6
River Basin: Merrimack	Volume (m ³):	32000
Latitude: 43°51'22" N	Relative depth:	0.7
Longitude: 71°32'30" W	Shore configuration:	1.20
Elevation (ft): 1370	Areal water load (m/yr):	28.86
Shore length (m): 950	Flushing rate (yr ⁻¹):	45.30
Watershed area (ha): 247.7	P retention coeff.:	0.44
% watershed ponded: 5.1	Lake type:	natural

<u>BIOLOGICAL:</u>		23 January 1996	12 July 1995
DOM. PHYTOPLANKTON (% TOTAL)	#1	NO PHYTOPLANKTON	DINOBYRON 15%
	#2	SAMPLE COLLECTED	TINY PENNATE DIATOM 15%
	#3		THIN FILAM. BL-GR 15%
PHYTOPLANKTON ABUNDANCE (units/mL)			
CHLOROPHYLL-A (µg/L)			1.07
DOM. ZOOPLANKTON (% TOTAL)	#1	NO ZOOPLANKTON	NAUPLIUS LARVA 40%
	#2	SAMPLE COLLECTED	KERATELLA 40%
	#3		
ROTIFERS/LITER			82
MICROCRUSTACEA/LITER			122
ZOOPLANKTON ABUNDANCE (#/L)			204
VASCULAR PLANT ABUNDANCE			Common/Abun
SECCHI DISK TRANSPARENCY (m)			1.7 Visible on bottom
BOTTOM DISSOLVED OXYGEN (mg/L)		13.0	7.9
BACTERIA (E. coli, #/100 ml)	#1		< 1
	#2		
	#3		

SUMMER THERMAL STRATIFICATION:

not stratified

Depth of thermocline (m): None
Hypolimnion volume (m³) : None
Anoxic volume (m³) : None

CHEMICAL:Lake: HALL POND, LOWER
Town: SANDWICH

	23 January 1996		12 July 1995		
DEPTH (m)	1.0		1.0		
pH (units)	5.2		6.1		
A.N.C. (Alkalinity)	0.9		2.2		
NITRATE NITROGEN	0.13		< 0.10		
TOTAL KJELDAHL NITROGEN	0.27		0.34		
TOTAL PHOSPHORUS	0.007		0.006		
CONDUCTIVITY (μ mhos/cm)	22.3		20.3		
APPARENT COLOR (cpu)	49		17		
MAGNESIUM			0.35		
CALCIUM			1.8		
SODIUM			< 1.0		
POTASSIUM			< 0.40		
CHLORIDE	< 2		< 2		
SULFATE			5		
TN : TP	57		57		
CALCITE SATURATION INDEX			4.6		

All results in mg/L unless indicated otherwise

TROPHIC CLASSIFICATION: 1995

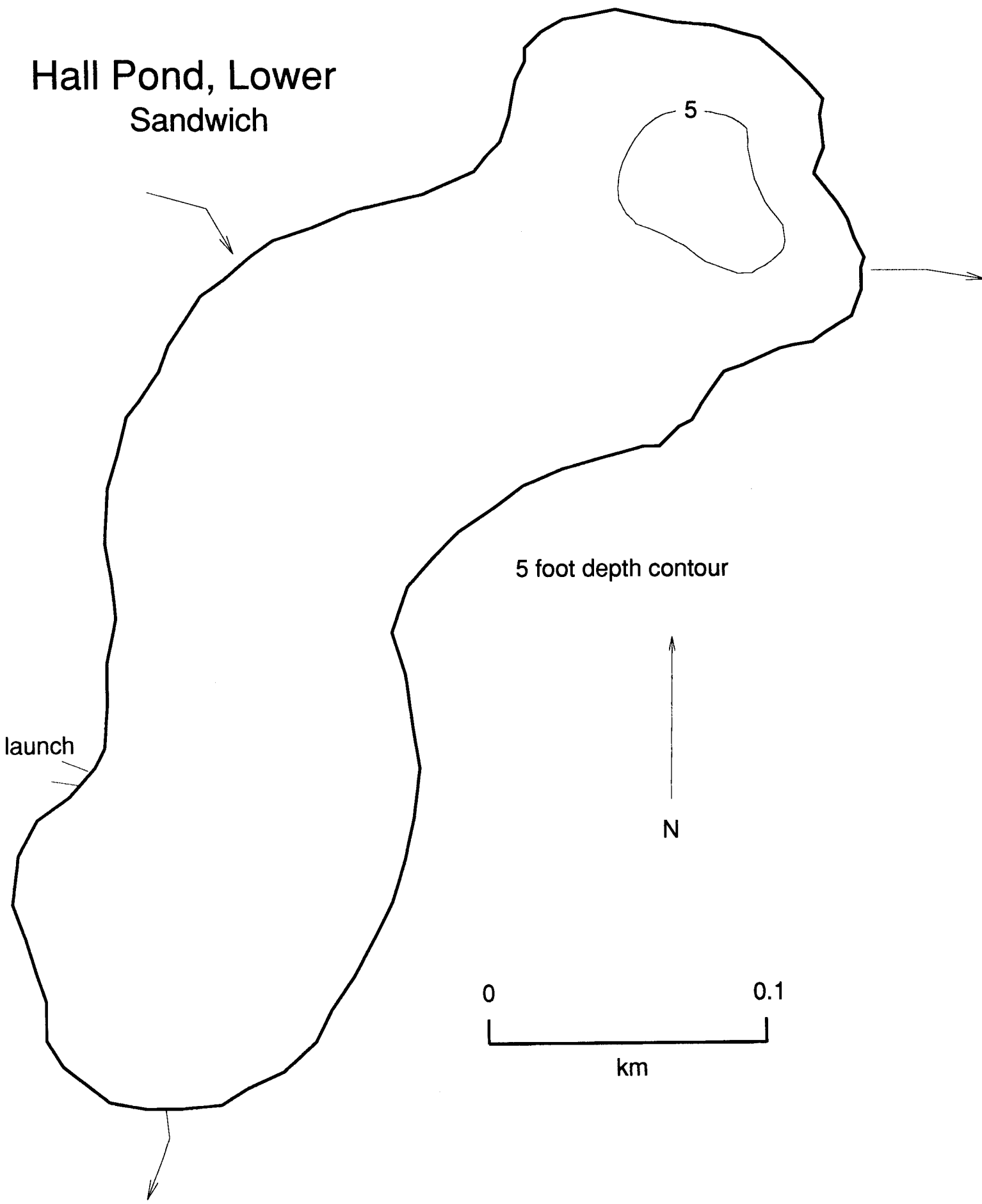
D.O. S.D. PLANT CHL TOTAL CLASS

**	2	4	0	6	Meso.
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COMMENTS:

1. This is a somewhat remote pond located off the Sandwich Notch Road. It was sampled a few times by helicopter in the DES/F&G Cooperative Remote Pond program.
2. This is the shallowest, by far, of the Hall Ponds, but does support brook trout. It is a mildly acidic, clear water pond with common to abundant macrophyte growth. It is borderline mesotrophic because of the macrophyte growth, but the water itself is oligotrophic.

Hall Pond, Lower
Sandwich



[illegible]

TOWN: SANDWICH
WEATHER: SUNNY WITH SLIGHT BREEZE

[illegible]

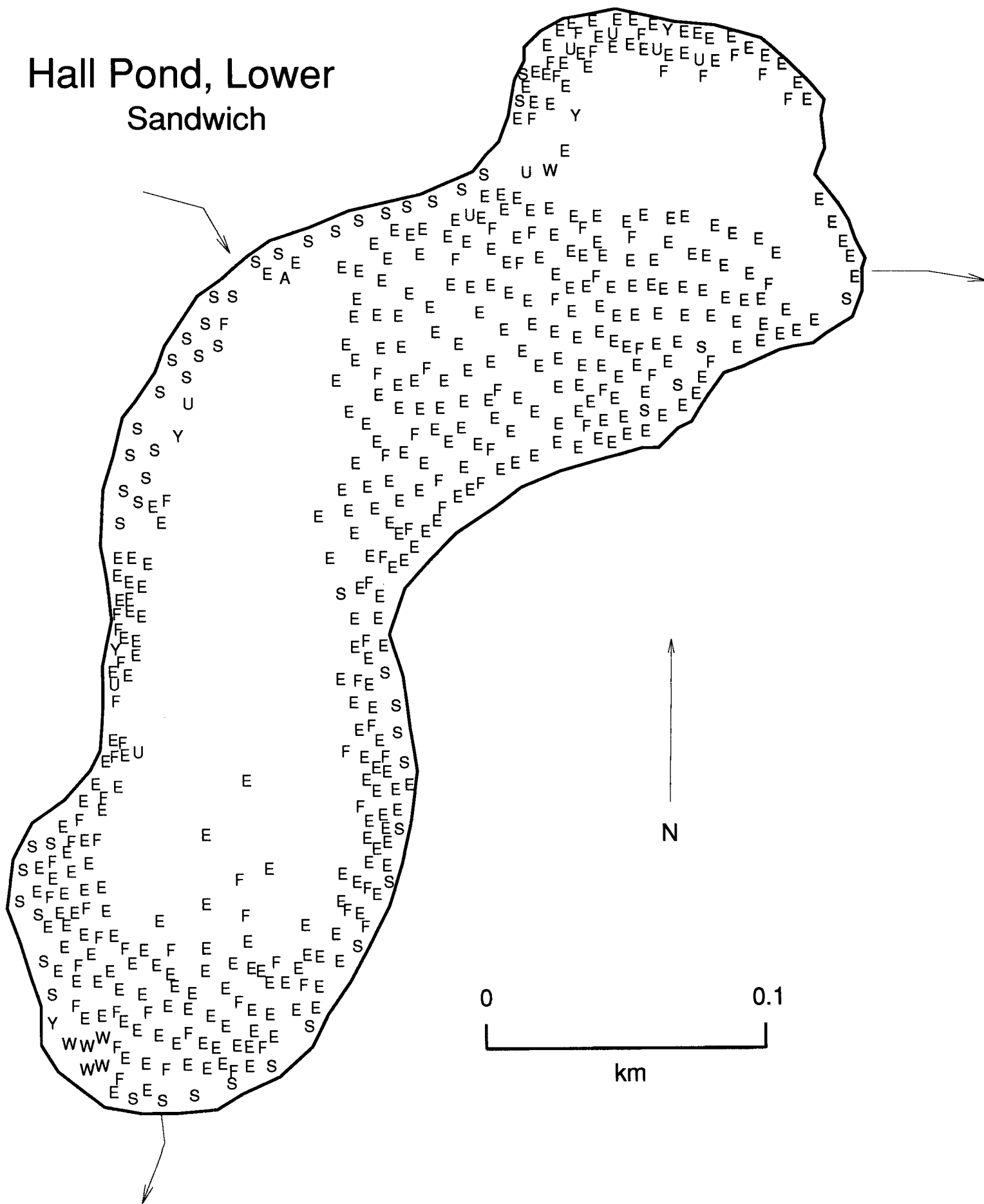
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SECCHI DISK (m):    1.7 VOB      COMMENTS:
BOTTOM DEPTH (m):   1.7
TIME: 1045

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*Dissolved oxygen values are in mg/L

Hall Pond, Lower Sandwich



[illegible]

DEPARTMENT of ENVIRONMENTAL SERVICES
Water Supply & Pollution Control Division - Biology Bureau

LAKE TROPHIC DATA

MORPHOMETRIC:

Lake: HALL POND, MIDDLE	Lake Area (ha):	3.24
Town: SANDWICH	Maximum depth (m):	17.0
County: Carroll	Mean depth (m):	7.5
River Basin: Merrimack	Volume (m ³):	243000
Latitude: 43°51'35" N	Relative depth:	8.4
Longitude: 71°32'45" W	Shore configuration:	1.00
Elevation (ft): 1460	Areal water load (m/yr):	34.22
Shore length (m): 600	Flushing rate (yr ⁻¹):	4.60
Watershed area (ha): 189.6	P retention coeff.:	0.41
% watershed ponded: 4.9	Lake type:	natural

BIOLOGICAL:

23 January 1996

12 July 1995

DOM. PHYTOPLANKTON (% TOTAL)	#1	PERIDINIUM 80%	DINOBYRON 35%
	#2	ASTERIONELLA 10%	MALLOMONAS 15%
	#3		
PHYTOPLANKTON ABUNDANCE (units/mL)			
CHLOROPHYLL-A (µg/L)			2.54
DOM. ZOOPLANKTON (% TOTAL)	#1	CALANOID COPEPOD 38%	CALANOID COPEPOD 37%
	#2	KELICOTTIA 29%	NAUPLIUS LARVA 24%
	#3		
ROTIFERS/LITER		6	18
MICROCRUSTACEA/LITER		15	52
ZOOPLANKTON ABUNDANCE (#/L)		21	70
VASCULAR PLANT ABUNDANCE			Scattered
SECCHI DISK TRANSPARENCY (m)			3.6
BOTTOM DISSOLVED OXYGEN (mg/L)		8.1	2.0
BACTERIA (E. coli, #/100 ml)	#1		< 1
	#2		< 1
	#3		

SUMMER THERMAL STRATIFICATION:

stratified

Depth of thermocline (m): 3.6
Hypolimnion volume (m³): 91750
Anoxic volume (m³): None

CHEMICAL:Lake: HALL POND, MIDDLE
Town: SANDWICH

	23 January 1996		12 July 1995		
DEPTH (m)	5.0	10.0	1.5	4.5	10.0
pH (units)	5.3	5.2	6.2	5.9	5.5
A.N.C. (Alkalinity)	1.0	0.7	1.8	1.2	1.1
NITRATE NITROGEN	0.12	0.08	< 0.10		0.07
TOTAL KJELDAHL NITROGEN	0.28	0.33	0.30	0.15	0.13
TOTAL PHOSPHORUS	0.009	0.009	0.009	0.007	0.006
CONDUCTIVITY (μ mhos/cm)	21.1	20.6	19.7	19.2	20.1
APPARENT COLOR (cpu)	50	55	23	23	23
MAGNESIUM			0.35		
CALCIUM			1.7		
SODIUM			< 1.0		
POTASSIUM			< 0.40		
CHLORIDE	< 2	< 2	< 2		< 2
SULFATE			4		4
TN : TP	44	46	33		33
CALCITE SATURATION INDEX			4.6		

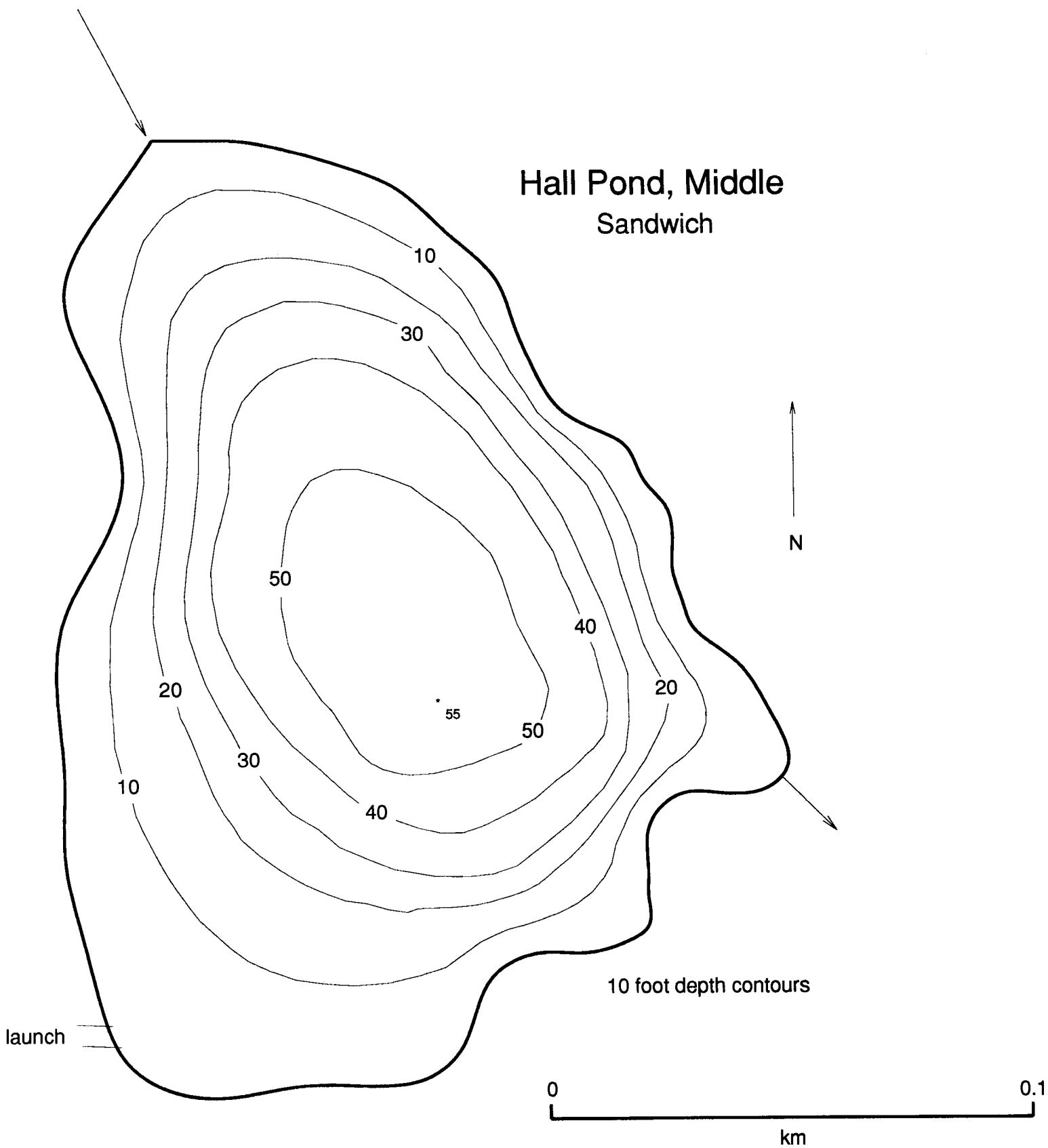
All results in mg/L unless indicated otherwise

TROPHIC CLASSIFICATION: 1995

D.O.	S.D.	PLANT	CHL	TOTAL	CLASS
2	2	1	0	5	Oligo.

COMMENTS:

1. This somewhat remote pond off the Sandwich Notch Road was surveyed cooperatively with the Fish and Game Department. It is also sampled occasionally by helicopter as part of the joint DES/F&G remote pond program.
2. This pond is the smallest (8 acres) but deepest (56 feet) of the Hall Ponds. It is a mildly acidic, oligotrophic pond with reasonably good dissolved oxygen levels in most of the deep bottom waters.

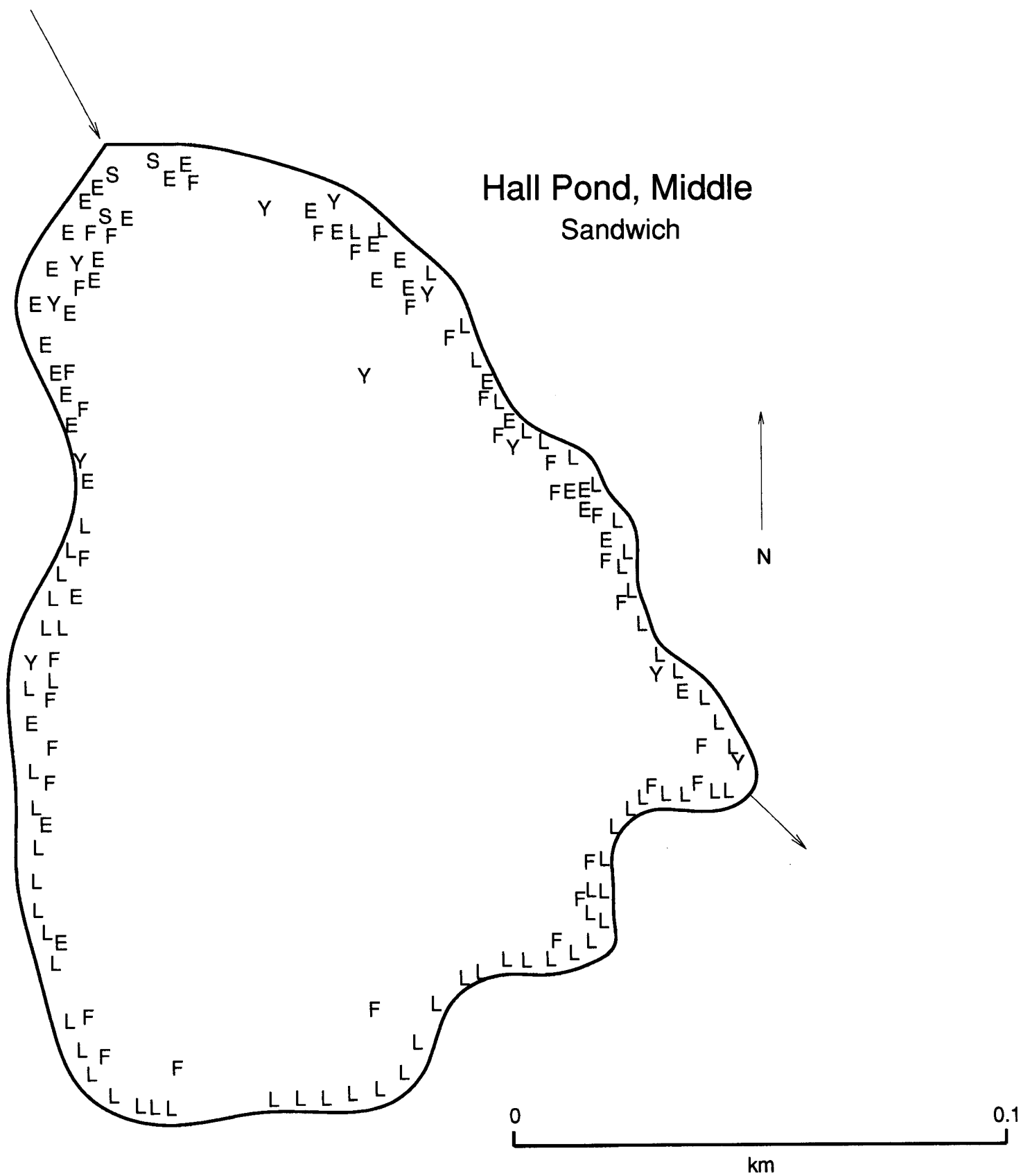


LAKE: HALL POND, MIDDLE
DATE: 07/12/95

WEATHER: SUNNY WITH SLIGHT BREEZE

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SECCHI DISK (m):    3.6
BOTTOM DEPTH (m):  15.3
                TIME: 1230
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*Dissolved oxygen values are in mg/L



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DEPARTMENT of ENVIRONMENTAL SERVICES
Water Division - Watershed Management Bureau

LAKE TROPHIC DATA

MORPHOMETRIC:

Lake: HALL POND, UPPER	Lake Area (ha):	9.19
Town: SANDWICH	Maximum depth (m):	13.2
County: Carroll	Mean depth (m):	3.6
River Basin: Merrimack	Volume (m ³):	329000
Latitude: 43°52'02" N	Relative depth:	3.9
Longitude: 71°33'00" W	Shore configuration:	1.31
Elevation (ft): 1587	Areal water load (m/yr):	6.63
Shore length (m): 1400	Flushing rate (yr ⁻¹):	1.80
Watershed area (ha): 82.9	P retention coeff.:	0.61
% watershed ponded: 0.0	Lake type:	natural

<u>BIOLOGICAL:</u>		2 March 1999	19 August 1998
DOM. PHYTOPLANKTON (% TOTAL)	#1	ASTERIONELLA 85%	NO PLANKTON SAMPLE
	#2	PERIDINIUM 15%	COLLECTED
	#3	(ALL ALGAE SPARSE)	
PHYTOPLANKTON ABUNDANCE (units/mL)			
CHLOROPHYLL-A (µg/L)			1.78
DOM. ZOOPLANKTON (% TOTAL)	#1	POLYARTHRA >99%	
	#2	ZOOPLANKTON SPARSE	
	#3	(ONE SPECIES OBSERVED)	
ROTIFERS/LITER		9	
MICROCRUSTACEA/LITER		<1	
ZOOPLANKTON ABUNDANCE (#/L)		9	
VASCULAR PLANT ABUNDANCE			Common
SECCHI DISK TRANSPARENCY (m)			4.5
BOTTOM DISSOLVED OXYGEN (mg/L)		6.3	1.1
BACTERIA (E. coli, #/100 ml)	#1		
	#2		
	#3		

SUMMER THERMAL STRATIFICATION:

stratified

Depth of thermocline (m): 4.2
Hypolimnion volume (m³): 23150
Anoxic volume (m³): None

CHEMICAL:

Lake: HALL POND, UPPER

Town: SANDWICH

	2 March 1999		19 August 1998		
DEPTH (m)	4.0	8.0	2.0	6.0	10.0
pH (units)	5.6	5.4	5.8	5.4	5.7
A.N.C. (Alkalinity)	2.3	1.1	0.8	0.9	1.9
NITRATE NITROGEN	0.23	0.24	< 0.05		< 0.05
TOTAL KJELDAHL NITROGEN	0.20	0.10	0.20	0.20	0.30
TOTAL PHOSPHORUS	0.006	0.007	0.007	0.008	0.010
CONDUCTIVITY (μ mhos/cm)	21.1	21.4	15.1	17.1	19.0
APPARENT COLOR (cpu)	23	23	23	33	33
MAGNESIUM			0.25		
CALCIUM			1.3		
SODIUM			< 1.0		
POTASSIUM			< 0.40		
CHLORIDE	< 2	< 2	< 2		< 2
SULFATE	4	4	3		
TN : TP	72	49	29		30
CALCITE SATURATION INDEX			5.5		

All results in mg/L unless indicated otherwise

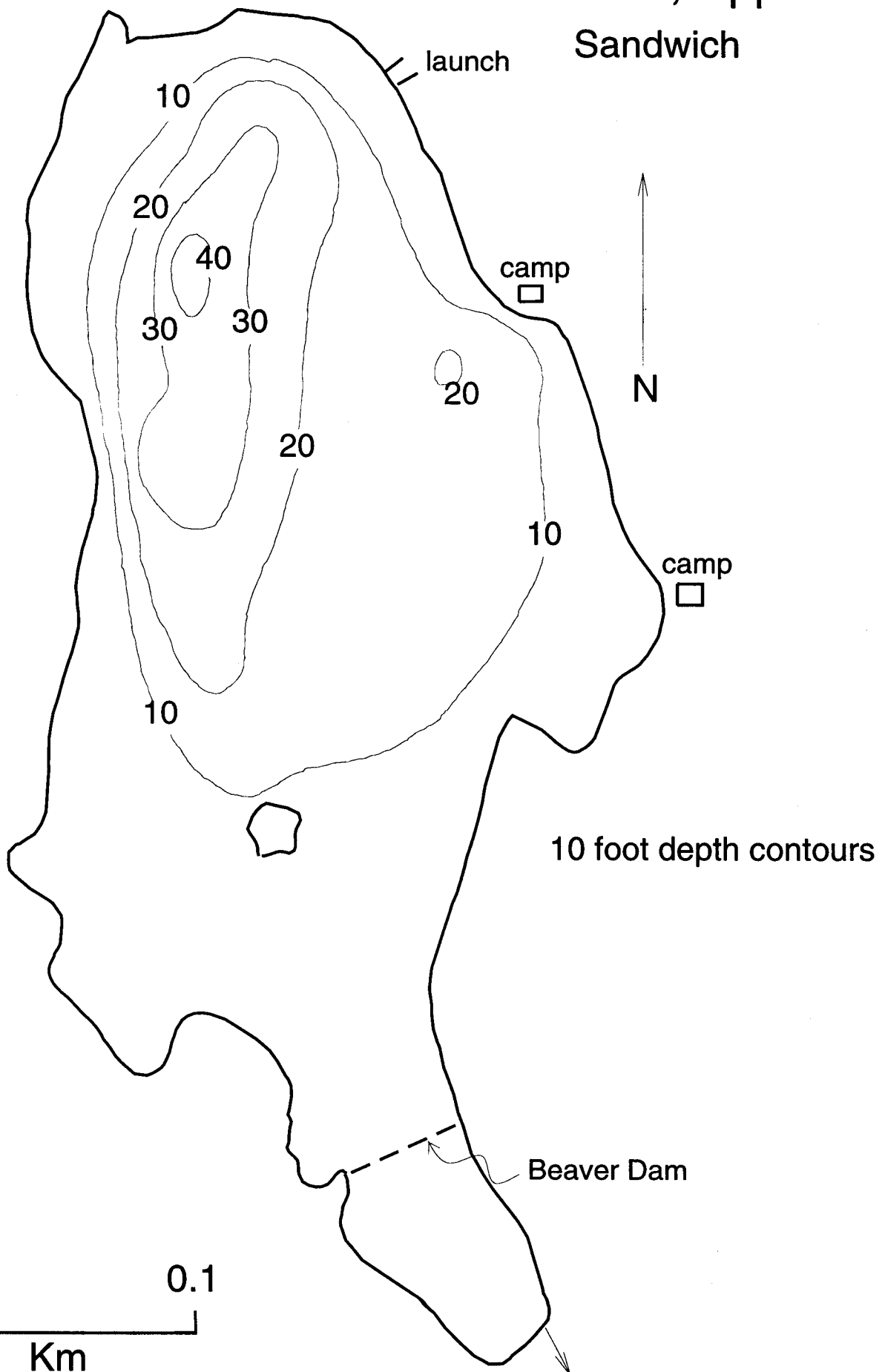
TROPHIC CLASSIFICATION: 1998

D.O.	S.D.	PLANT	CHL	TOTAL	CLASS
1	2	3	0	6	Oligo.

COMMENTS:

1. This pond was previously surveyed and classified in 1985. There was no change in trophic class and little change in trophic quality between the two dates.
2. This is the uppermost of a series of three Hall Ponds. These ponds are periodically sampled as part of the joint DES/F&G remote pond acid rain program, with the middle pond being sampled in recent years.
3. This is a moderately acidic, relatively clear-water pond with low nutrient and ion levels.
4. Access is via a short 4-wheel drive road off Sandwich Notch Road; launch is adequate for small boats and trailers.
5. Two rustic camps were present; no other development.
6. No motors are allowed on the pond.

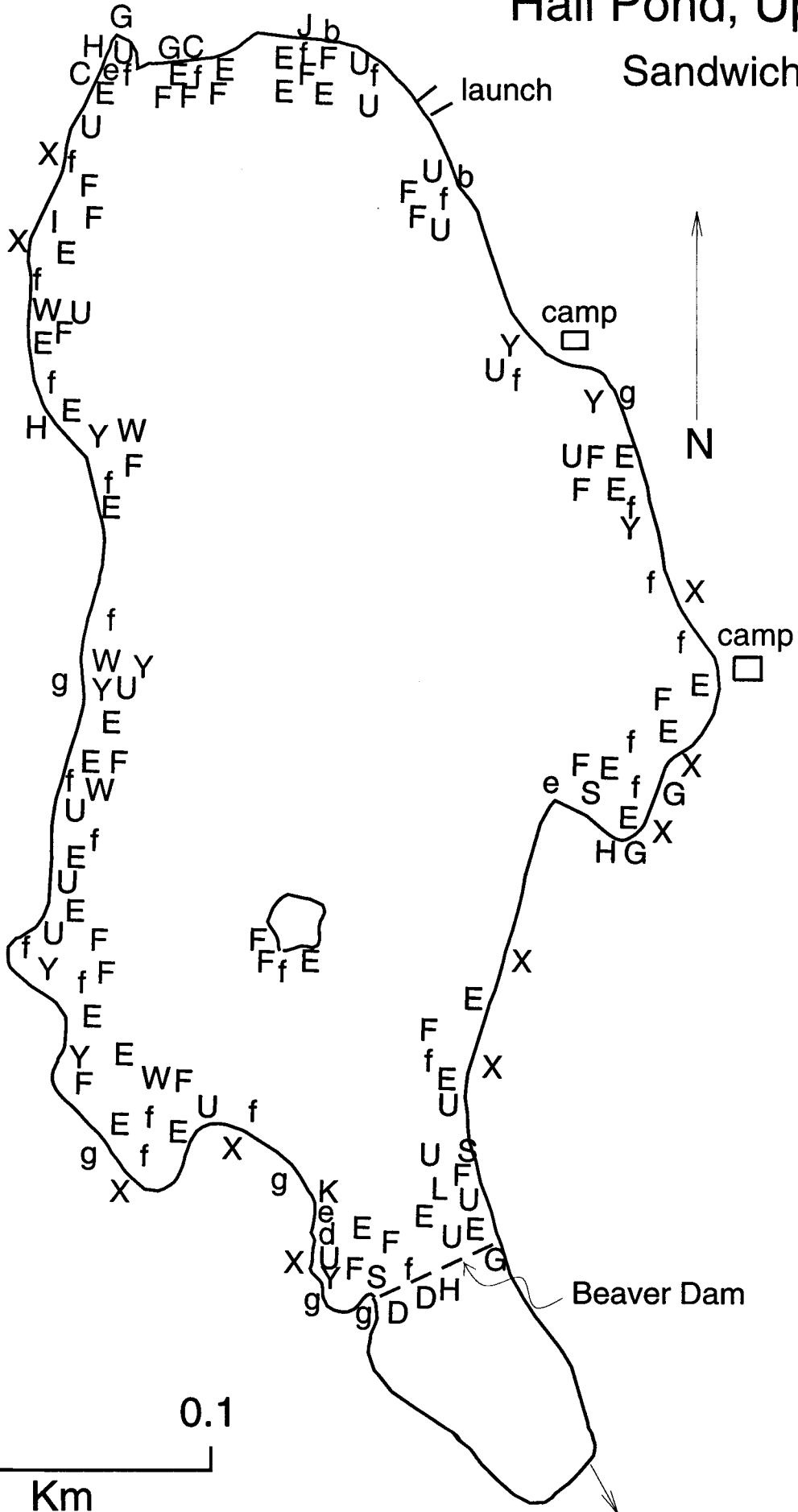
Hall Pond, Upper Sandwich



[illegible]

Hall Pond, Upper

Sandwich



A horizontal scale bar with vertical end caps. The number '0' is at the left end and '0.1' is at the right end. Below the bar, the unit 'Km' is centered.

AQUATIC PLANT SURVEY

LAKE: HALL POND, UPPER

TOWN: SANDWICH

DATE: 08/19/1998

Key	PLANT NAME		ABUNDANCE
	GENERIC	COMMON	
J	Juncus	Rush	Sparse
I	Spongilla	Freshwater sponge	Sparse
E	Eriocaulon septangulare	Pipewort	Common
C	Carex	Sedge	Sparse
F	Nymphoides cordatum	Floating heart	Scattered
U	Utricularia	Bladderwort	Common
S	Sparganium	Bur reed	Sparse
f		Filamentous algae	Common
G	Gramineae	Grass family	Sparse
W	Potamogeton natans	Floating-leaf pondweed	Sparse
X		Unknown plant	Scattered
L	Lobelia dortmanna	Water lobelia	Sparse
H	Hypericum	St. John's-wort	Sparse
D	Dulichium arundinaceum	Three-way sedge	Sparse
b	Scirpus	Bulrush	Sparse
g	Myrica gale	Sweet gale	Sparse
d	Drosera	Sundew	Sparse
e	Elatine	Waterwort	Sparse
K	Lysimachia terrestris	Swampcandle	Sparse
Y	Nuphar	Yellow water lily	Sparse

OVERALL ABUNDANCE: Common

GENERAL OBSERVATIONS:

1. The unknown plant was a woody shrub with red berries.
2. More plant species were identified in 1998 as compared to 1985, but the overall abundance was unchanged.
3. Beaver lodge was present.
4. Wetland was present at the outlet (southern) end.